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DATA APPENDIX FOR A MICROECONOMETRIC CHRONICLE
OF THE GREEN REVOLUTION

By

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TABLE 1: VALUE OF TOTAL OUTPUT, AND VALUE OF TOTAL MARKETED SURPLUS
(INDICES AT CONSTANT 1952 PRICES)

Year	Value of Total Output	Value of Total Marketed Surplus
1952	100.0 (487.877)*	100.0 (259.118)*
1953	104.3	107.4
1954	109.2	120.6
1955	112.1	121.3
1956	114.7	127.1
1957	119.3	136.3
1958	127.8	149.9
1959	132.2	161.4
1960	139.4	172.5
1961	144.5	182.9
1962	157.5	201.2
1963	167.0	221.1
1964	181.1	257.2
1965	201.7	293.0

* Millions of rupees.

TABLE 2: AVERAGE FACTOR PRODUCTIVITIES (INDICES AT CONSTANT 1952 PRICES)

Year	Cropped Acre	Cultivated Acre	Labor	Total Capital
Unit	RS./Acre	RS./Acre	RS./Man Day	RS./RS.
1952	100.0 (156.96)	100.0 (208.85)	100.0 (4.11)	100.0 (1.892)
1953	101.65	104.09	101.96	102.25
1954	103.02	106.02	108.01	118.82
1955	107.79	107.79	117.13	126.52
1956	103.05	107.00	120.6	115.39
1957	110.98	119.53	132.70	124.01
1958	107.85	121.14	145.55	134.10
1959	110.07	118.88	144.79	126.27
1960	110.20	116.17	154.37	138.57
1961	115.42	120.03	162.90	149.43
1962	125.2	131.19	175.00	150.00
1963	129.36	140.46	179.00	150.86
1964	135.24	154.92	188.84	140.82
1965	147.33	167.52	191.55	146.27

Figures in parentheses give amounts in the base year.

TABLE 3: INDICES OF VARIABLE, QUASI-FIXED AND FIXED INPUTS

Year	Labor Days	Bullock Labor Days	Tractor Hours	Nitrogen Fertilizers (Nutrient Kg) (1957=100)	Irrigations Delivered (Std. Units) (Water)*	Total Cash Used (Uninflated)	Gross Area Sown (Land)
1952	100.0 (118.73)	100.0 (63.32)	100.0 (1.52)	---	100.0 (16.51)	100.0 (257.83)	100.0 (3.1083)
1953	102.3	98.4	121.4	---	103.3	102.0	102.6
1954	101.1	95.4	149.3	---	105.5	96.1	106.0
1955	95.7	84.3	178.8	---	105.2	86.3	104.0
1956	95.1	81.7	213.0	---	104.5	91.9	111.3
1957	89.9	66.8	252.5	100.0 (5.61)	108.0	101.3	107.5
1958	87.8	61.3	304.9	152.6	107.3	103.3	111.8
1959	91.3	63.0	345.4	150.1	114.1	118.2	120.1
1960	90.3	60.0	329.7	133.9	110.5	117.8	126.5
1961	88.7	52.9	392.7	163.6	116.4	120.8	125.2
1962	90.0	50.7	435.2	368.2	119.6	131.4	125.8
1963	93.3	53.7	454.0	438.8	125.9	141.6	129.1
1964	95.9	56.4	447.2	738.1	129.6	174.0	133.9
1965	105.3	61.7	480.6	1208.5	139.0	210.5	136.9

* A standard irrigation unit is defined as 3 acre inches of water delivered in the fields.

Figures in parentheses give factor utilization in millions for the base year 1952.

TABLE 4: SELECTED CAPITAL GOODS: STOCKS AND NET INVESTMENT*

Year	Tractors			Tubewells			Power Thresher			Power Cane Crushers		
	Initial Number In Use	Additional Investments	Index of Number In Use	Number in Use	Additional Investments	Index of Number In Use	Number In Use	Additional Investments	Index of Number In Use	Number In Use	Additional Investments	Index of Number In Use
1952	423 (423)	90	100.0	1054 (1054)	243	100.0	--	--	--	365	54	100.0
1953	513	109	121.3	1297	300	123.1	--	--	--	419	62	114.8
1954	622	132	147.0	1597	369	151.5	--	--	--	481	71	131.8
1955	754 (747)	161	178.3	1966	454	186.5	--	--	--	552	--	151.2
1956	915	195	216.3	2410	559	228.6	--	--	--	502 (419)	--	137.5
1957	1100	236	260.0	2979	688	282.6	--	--	--	439	--	120.3
1958	1346 (1346)	267	318.2	3667	847	347.9	--	--	--	355	--	97.3
1959	1613	272	381.3	4514	1043	428.3	--	--	--	259	--	70.9
1960	1885 (1720)	250	445.6	5557	1283	527.2	--	--	--	149	82	40.8
1961	2135	237	504.7	6830	1580	648.0	--	--	--	131	121	35.9
1962	2372	223	560.8	8420 (8465)	1261	798.9	--	--	--	164 (785)	--	44.9
1963	2595	213	613.5	9681	1093	918.5	100	85	100	93	--	25.5
1964	2808	208	663.8	10774	1542	1022.2	185	285	185	41	--	11.2
1965	3016	212	713.0	12316	1186	1168.5	443	337	443	11	--	3.0

* Figures in parentheses give the actual number in use in the region. Sources: W. Hendrik and V. Gori (1968); Board of Economic Inquiry: Economics of Tractor Cultivation in Punjab, 1949-50 (p. 3) and 1957-58 (p. 1) and Statistical Abstract of the Punjab, 1960 (pp. 152-153) and 1965 (pp. 138-139).

TABLE 5: LAND PREPARATION BY TRADITIONAL AND MODERN TECHNOLOGY

Year	By Bullocks	By Tractor	Total	Percent by Tractor	Index Total (1952=100)	Index Tractor (1952=100)
(1000's of acres per pound)						
1952	4320.3	547.8	4868.1	11.3	100.0	100.0
1953	4308.9	669.8	4978.7	13.5	102.3	122.3
1954	4478.5	809.4	5287.9	15.3	108.6	147.8
1955	4239.5	1015.9	5255.4	19.3	107.9	185.4
1956	4432.5	1299.8	5732.3	22.7	117.7	237.3
1957	4036.9	1552.0	5588.9	27.8	114.8	283.3
1958	4362.2	1684.4	6046.6	27.9	124.2	307.5
1959	4352.1	2043.7	6395.6	32.0	131.4	373.1
1960	4518.2	2135.8	6653.0	32.1	136.7	389.9
1961	4263.4	2437.3	6700.7	36.4	137.6	444.9
1962	4148.7	2615.6	6764.3	38.7	138.9	477.5
1963	4398.5	2653.1	7051.6	37.6	144.9	484.3
1964	4716.0	2507.5	7223.5	34.7	148.4	457.7
1965	4462.5	2649.5	7112.0	37.3	146.1	483.7

TABLE 6: GROSS AREA SOWN BY TRADITIONAL AND MODERN TECHNOLOGIES

Year	Technology		Total Gross Area Sown	Percent Sown by Tractor	Index Total (1952=100)	Index Tractor (1952=100)
	Bullock	Tractor				
(1000 acres)						
1952	2776.6	231.8	3008.4	7.7	100.0	100.0
1953	2802.6	282.7	3085.3	9.2	102.6	121.9
1954	2847.3	342.1	3189.4	10.7	106.0	147.6
1955	2706.2	423.6	3129.8	13.5	104.0	182.7
1956	2821.2	528.2	3349.4	15.8	111.3	227.9
1957	2610.2	625.1	3235.3	19.3	107.5	269.7
1958	2655.9	707.2	3363.1	21.0	111.8	305.1
1959	2772.0	841.8	3613.8	23.3	120.1	363.2
1960	2904.8	900.6	3805.4	23.7	126.5	388.5
1961	2747.3		3768.4	27.1	125.2	440.5
1962	2703.5	1081.0	3784.5	28.6	125.8	466.9
1963	2836.5	1046.1	3882.6	26.9	129.1	451.2
1964	2976.2	1052.3	4028.4	26.1	133.9	453.9
1965	3114.7	1074.2	4188.9	25.6	136.9	463.4

TABLE 7: TRANSPORTATION BY MODERN AND TRADITIONAL TECHNOLOGIES

Year	By Bullock Cart	By Tractor Trailer	Total	Percent by Tractor	Index Total (1952=100)	Index Tractor (1952=100)
(10,000 quintals)						
1952	200.9	1245.8	1446.7	86.1	100.0	100.0
1953	666.3	1478.4	2144.7	68.9	148.2	118.7
1954	730.7	1806.7	2536.7	71.8	175.3	145.0
1955	709.5	1960.8	2670.3	73.4	184.6	157.4
1956	742.2	1714.2	2456.4	69.8	169.8	137.6
1957	784.7	1940.2	2290.4	84.7	158.3	155.7
1958	813.0	350.2	1163.2	30.1	80.4	28.1
1959	809.3	3331.2	4239.5	78.6	293.0	267.4
1960	1092.4	1544.6	2636.0	58.6	182.2	123.9
1961	1104.7	2809.6	3915.3	71.7	270.6	225.5
1962	1162.9	4276.4	5443.8	78.6	376.2	343.3
1963	1299.6	4449.8	5749.4	77.4	397.4	357.2
1964	1548.9	4045.8	5594.7	72.3	386.7	324.7
1965	1744.8	5435.8	7180.6	75.7	496.3	436.3

TABLE 8: IRRIGATION BY VARIOUS MEANS

Year	By Canal	By Persian Wheel	By Tubewell	Percent by Persian Wheel	Percent by Tubewell	Index Total (1952=100)	Index Tubewell Use
(1000 standard units)							
1952	4,958	8,942	2,610	54.2	15.8	100.0	100.0
1953	5,236	8,605	3,214	50.5	18.8	103.3	123.1
1954	5,438	8,025	3,956	46.1	22.7	105.5	151.5
1955	6,321	6,191	4,870	35.6	28.0	105.2	186.6
1956	5,534	5,769	5,950	33.4	34.5	104.5	228.0
1957	7,156	3,754	6,921	21.1	38.8	108.0	265.2
1958	7,676	2,268	7,779	12.8	43.9	107.3	298.1
1959	6,716	2,383	9,731	12.7	51.7	114.1	372.8
1960	7,172	1,321	9,745	7.3	53.4	110.5	373.3
1961	6,704	535	11,985	2.8	62.3	116.4	459.1
1962	6,972	---	12,774	--	64.7	119.6	489.4
1963	6,874	---	13,920	--	66.9	125.9	533.3
1964	6,400	---	15,000	--	70.1	129.6	574.7
1965	7,268	---	15,687	--	68.3	139.0	601.0

TABLE 9: CANE CRUSHING BY MODERN AND TRADITIONAL TECHNOLOGIES

Year	By Bullocks	By Diesel	Total	Percent by Diesel	Index Total (1952=100)	Index Diesel (1952=100)
(100,000 quintal units)						
1952	48.5	26.3	74.8	35.2	100.0	100.0
1953	45.7	30.3	75.0	40.4	100.3	115.2
1954	18.1	34.7	52.9	65.6	70.7	131.9
1955	34.8	32.1	66.9	48.0	89.4	122.1
1956	40.7	29.2	69.9	41.8	93.4	111.0
1957	48.1	24.5	72.6	33.8	97.1	93.1
1958	58.4	21.2	79.6	26.6	106.4	80.6
1959	60.8	10.5	71.3	14.7	95.3	39.9
1960	62.8	6.4	69.2	9.3	92.5	24.3
1961	56.4	14.0	70.4	19.9	94.1	53.2
1962	70.4	12.7	83.1	15.3	111.1	48.3
1963	55.9	12.7	68.6	18.5	91.7	48.3
1964	20.0	12.7	32.7	38.8	43.7	48.3
1965	48.3	5.2	53.5	9.7	71.5	19.8

TABLE 10: RABI HARVESTING AND THRESHING BY MODERN AND TRADITIONAL TECHNOLOGY

Year	By Bullocks	By Tractor	Total	Percent by Bullocks	Index Total (1952=100)
(10,000 quintal units)					
1952	682	---	682	100.0	100.0
1953	692	---	692	100.0	101.5
1954	730	---	730	100.0	107.1
1955	742	---	742	100.0	108.8
1956	754	---	754	100.0	110.6
1957	767	---	767	100.0	112.5
1958	779	---	779	100.0	114.2
1959	791	---	791	100.0	116.0
1960	1025	---	1025	100.0	150.3
1961	1032	---	1032	100.0	151.3
1962	1104	---	1104	100.0	161.9
1963	1124	39	1163	96.6	170.5
1964	1198	101	1299	92.2	190.5
1965	1296	174	1470	88.2	215.5

TABLE 11: ACREAGES SOWN TO NEW VARIETIES IN CENTRAL PUNJAB*

Year	Wheat		Maize		Rice		Bajra	
	1000 Acres	Percent of Crop	1000 Acres	Percent of Crop	1000 Acres	Percent of Crop	1000 Acres	Percent of Crop
1958	--	--	1.1	0.47	--	--	--	--
1959	--	--	1.9	0.62	--	--	--	--
1960	15.0	1.83	3.3	1.16	--	--	--	--
1961	22.1	2.78	5.8	2.01	--	--	--	--
1962	32.6	3.83	10.2	3.32	3.8	1.92	0.3	2.63
1963	48.0	5.25	17.9	5.17	5.6	2.47	4.0	36.03
1964	70.7	6.86	31.4	9.19	8.2	3.35	6.0	34.68
1965	104.2	9.54	55.1	14.18	12.0	4.02	9.0	52.94

*The percentages are estimated on the basis of total irrigated acreage sown to the various crops, as predicted by the model. No actual data on acreages sown to new varieties are available.

TABLE 12: TOTAL ACREAGE FERTILIZED FOR VARIOUS CROPS AND INDICES OF NITROGEN AND PHOSPHORUS USE

Year	Wheat (Local)	Wheat (High Yield)	Cotton (American)	Maize (Hybrid)	Rice (Jhona)	Rice (High Yield)	Sugarcane	Groundnut	Bajra (Hybrid)	Index of Total N Use	Index of Total P Use	Total Acreage Fertilized
1000 Acres										1957 = 100		
1957	462.1	--	--	--	--	--	--	6.0	--	100.0 (5.61)	100.0 (0.07)	468.1
1958	85.6	--	89.3	1.1	--	--	132.1	9.8	--	152.6	163.8	317.9
1959	--	--	196.2	1.9	--	--	101.4	7.6	--	150.1	211.6	307.1
1960	491.8	15.0	--	3.3	--	--	--	1.7	--	133.9	264.7	511.8
1961	560.4	22.2	--	5.8	--	--	--	1.5	--	163.6	381.6	589.9
1962	818.3	32.5	---	10.2	--	3.8	154.0	4.5	--	368.2	1304.6	1023.3
1963	864.8	48.0	103.1	17.9	---	5.6	150.9	--	--	438.8	1804.1	1190.3
1964	958.6	70.7	194.4	31.4	235.9	8.2	121.9	--	6.0	738.1	3202.2	1621.1
1965	978.1	104.2	211.4	55.5	286.3	12.0	140.9	--	9.0	1208.5	5317.8	1797.4

Figures in parentheses give the nutrient use in the base year in million kilograms.

*The model permitted fertilization for crops sown only under irrigated conditions.

TABLE 13: PERCENTAGES OF TOTAL IRRIGATED AREA UNDER FERTILIZATION AND THE AVERAGE LEVEL OF NITROGEN USE FOR VARIOUS CROPS (In Kgs./Acre)

Year	Local Wheat										
	Percent Irrigated	Kgs./Acre	Wheat (High Yield)	Cotton (American)	Maize (Hybrid)	Rice (Jhona)	Rice (High Yield)	Sugarcane	Groundnut	Bajra (Hybrid)	All Crops
1957	68.6	12.4	a	--	a	a	--	--	21.0 (12.14)	a	19.8 (3.6)
1958	11.4	12.4	a	35.6 (16.2)	100.0 (40.5)	a	--	100.0 (36.4)	25.7 (12.14)	a	12.3 (8.1)
1959	--	--	a	85.9 (16.2)	100.0 (40.5)	a	--	76.7 (36.4)	25.1 (20.2)	a	11.3 (8.3)
1960	61.4	12.4	100.0 (48.6)	--	100.0 (16.2)	a	--	--	100.0 (32.4)	a	19.0 (4.4)
1961	72.6	12.4	100.0 (57.9) ^b	--	100.0 (16.2)	a	---	--	100.0 (32.4)	a	21.2 (4.7)
1962	100.0	12.4	100.0 (55.3) ^b	--	100.0 (20.9)	a	100.0 (28.3)	100.0 (36.4)	100.0 (32.4)	a	35.8 (6.1)
1963	100.0	12.4	100.0 (56.0) ^b	52.1 (16.2)	100.0 (40.5)	a	100.0 (28.7)	100.0 (36.4)	--	--	40.4 (6.2)
1964	100.0	19.7	100.0 (48.6)	100.0 (16.2)	100.0 (40.5)	100.0 (16.2)	100.0 (30.0)	100.0 (36.4)	--	100.0 (16.2)	53.3 (7.7)
1965	100.0	26.9	100.0 (48.6)	100.0 (16.2)	100.0 (40.5)	100.0 (16.2)	100.0 (30.0)	100.0 (36.4)	--	100.0 (16.2)	55.9 (11.4)

Figures in the parentheses give the average nitrogen use in kilograms/acre except for groundnut where they give the average phosphorus use per acre.

^aNew variety not introduced yet.

^b Implies some use of phosphorus in addition to the use of nitrogen.

TABLE 14: ESTIMATED AVERAGE YIELDS FOR VARIOUS CROPS*

Year	Wheat	Gram	Cotton	Maize	Rice	Sugarcane	Groundnut	Bajra
1952	100.0 (4.46)	100.0 (4.89)	100.0 (2.04)	100.0 (4.92)	100.0 (4.91)	100.0 (138.3)	100.0 (2.96)	100.0 (1.69)
1953	101.3	101.6	112.2	101.0	100.6	99.5	121.6	117.2
1954	102.2	100.8	127.5	104.5	100.0	99.6	99.3	110.6
1955	101.6	100.6	136.3	108.3	100.2	99.4	97.8	111.8
1956	96.9	100.4	140.2	100.4	100.2	99.6	93.6	108.3
1957	124.2	100.4	139.7	101.2	100.6	100.0	90.5	113.6
1958	95.5	111.7	146.6	102.6	100.4	139.6	94.9	108.9
1959	98.0	100.4	157.8	109.1	100.6	130.3	91.5	111.8
1960	119.0	97.9	130.8	110.6	100.4	81.9	83.4	107.1
1961	125.3	98.2	135.3	112.4	100.4	99.7	82.1	114.2
1962	136.5	98.6	134.3	114.4	105.3	139.4	85.5	120.7
1963	143.0	97.5	144.1	117.9	107.1	139.4	80.7	120.7
1964	157.4	100.2	151.5	122.4	137.5	139.3	80.7	98.2
1965	172.4	99.4	158.8	131.3	139.5	166.8	80.7	82.3

Figures in parentheses give the predicted average yield in the base year in quintals.

TABLE 15: TOTAL ANNUAL OUTLAYS ON NON-FARM INPUTS (INDICES AT CONSTANT 1952 PRICES)

Year	Outlays on Chemical Nutrients	Outlays on Variable Inputs ^a	% of Total Variable Outlays on Nutrients	Outlays on Capital Goods ^b	Total Outlays On Non-Farm Inputs	% of Total Cash Outlays ^c
1952	--	100.0 (10.9882)	--	100.0 (2.5317)	100.0 (13.5119)	2.76
1953	--	115.6	--	121.7	116.86	3.10
1954	--	133.86	--	148.4	136.66	3.46
1955	--	162.76	--	181.5	166.38	4.11
1956	--	172.37	--	221.1	181.61	4.38
1957	100.0 (8.6493)	282.78	27.8	269.2	280.41	6.51
1958	131.25	331.91	31.1	314.8	328.9	7.13
1959	124.94	351.07	28.0	344.7	350.09	7.33
1960	122.29	348.58	27.6	361.9	351.21	6.98
1961	147.86	410.07	28.4	392.8	407.08	7.80
1962	333.06	576.27	45.5	338.5	532.07	9.36
1963	405.46	651.9	48.9	315.1	589.18	9.77
1964	677.98	876.59	60.9	379.3	783.92	11.99
1965	1098.44	1227.72	70.4	351.9	1064.34	14.61

^aChemical nutrients, diesel fuel and canal water charges.

^bTractors, tubewells, harvesters and implements.

^cTotal cash outlays include non-farm produced inputs plus seeds, manures, concentrates for animal draft and hired labor.

TABLE 16: FUEL CONSUMED BY TRACTORS AND DIESEL ENGINES 1952-1965

Year	Fuel Consumption		Total Fuel Consumption	Indices of Fuel Consumption		
	Tractors	Diesels		Tractor	Diesel	Total
	(in 1000 Litres)					
1952	3344	8064	11408	100.0 (1520.1)*	100.0 (5376.0)*	100.0
1953	4058	9819	13877	121.4	121.8	121.6
1954	4994	11946	16940	149.3	148.1	148.5
1955	5979	14137	20116	178.8	175.3	176.3
1956	7124	16736	23860	213.0	207.5	209.2
1957	8444	18960	27404	252.5	235.1	240.2
1958	10197	20972	31169	304.9	260.1	273.2
1959	11550	25377	36927	345.4	314.7	321.9
1960	11025	25191	36216	329.7	312.4	317.5
1961	13133	31313	44446	392.7	388.3	389.6
1962	14555	33254	47809	435.2	412.4	419.1
1963	15184	36176	51360	454.0	448.6	450.2
1964	14954	38930	53884	447.2	482.8	472.3
1965	16074	40298	56372	480.6	499.7	494.1

* Figures in parentheses give the hours of use in base year in thousands.

TABLE 17: INDICES OF TOTAL PRODUCTION, MARKETED SURPLUS AND CONSUMPTION OF WHEAT

Year	Sales as a Percent of Production	Index of Production	Index of Sales	Index of Consumption
1952	53.4	100.0 (4680.0)	100.0 (2497.7)	100.0 (2182.3)
1953	55.6	107.0	111.6	101.7
1954	57.1	108.6	116.1	100.0
1955	52.5	105.0	103.2	107.0
1956	55.2	110.7	114.5	106.3
1957	64.2	137.5	165.3	105.4
1958	52.3	108.3	106.1	110.7
1959	57.3	118.1	126.7	108.2
1960	62.0	152.2	176.7	124.0
1961	63.9	152.4	182.6	117.9
1962	66.4	175.7	218.5	126.6
1963	67.6	188.2	238.4	130.7
1964	76.9	225.5	324.8	111.8
1965	80.3	248.1	373.2	104.8

Figures in parentheses give amounts in the base year in thousand quintals.

TABLE 18: INDICES OF TOTAL PRODUCTION, MARKETED SURPLUS AND CONSUMPTION OF GRAM

Year	Sales as a Percent of Production	Index of Production	Index of Sales	Index of Consumption
1952	96.6	100.0 (2103.8)	100.0 (2033.3)	100.0 (70.5)
1953	96.2	90.0	89.6	101.7
1954	95.8	102.7	101.9	129.0
1955	95.6	118.6	117.3	156.1
1956	95.5	111.9	110.7	148.9
1957	91.5	56.1	53.1	141.5
1958	96.8	129.7	129.8	124.2
1959	96.6	113.5	113.4	115.7
1960	97.0	147.6	148.1	134.0
1961	96.9	151.3	151.7	138.8
1962	96.4	133.8	133.5	144.2
1963	96.3	133.6	133.1	147.9
1964	96.6	115.6	115.6	115.6
1965	95.2	112.6	110.9	160.8

Figures in parentheses give amounts in base year in thousand quintals.

TABLE 19: INDICES OF TOTAL PRODUCTION, MARKETING SURPLUS AND CONSUMPTION OF MAIZE

Year	Sales as a Percent of Output	Index of Production	Index of Sales	Index of Consumption
1952	39.8	100.0 (1432.1)	100.0 (570.4)	100.0 (851.7)
1953	48.7	119.3	145.8	101.7
1954	52.7	124.4	164.7	97.8
1955	43.5	115.9	126.5	108.8
1956	42.8	114.2	122.7	108.6
1957	48.9	127.8	157.0	108.4
1958	51.8	137.1	179.5	109.7
1959	63.2	163.2	258.8	100.0
1960	69.3	150.1	261.2	76.5
1961	62.5	151.7	238.7	94.1
1962	59.3	162.8	242.3	110.1
1963	71.1	192.0	342.8	92.2
1964	67.0	199.8	336.2	109.5
1965	68.1	236.5	404.1	125.5

Figures in parentheses give amounts in base year in thousand quintals.

TABLE 20: INDICES OF TOTAL PRODUCTION, MARKETING SURPLUS AND CONSUMPTION OF RICE

Year	Sales as a Percent of Output	Index of Production	Index of Sales	Index of Consumption
1952	88.9	100.0 (496.5)	100.0 (441.7)	100.0 (54.8)
1953	88.0	93.4	92.4	101.7
1954	90.5	97.0	98.6	83.8
1955	87.5	96.2	94.7	108.8
1956	89.0	101.0	101.1	100.5
1957	90.6	108.4	110.4	91.8
1958	87.6	113.2	111.5	126.8
1959	93.2	152.3	159.7	93.2
1960	95.8	186.8	201.2	70.7
1961	93.7	189.6	199.8	107.9
1962	93.5	206.5	217.1	121.0
1963	95.0	240.3	256.5	109.4
1964	98.4	331.8	367.1	47.4
1965	96.5	410.4	445.7	126.2

Figures in parentheses give amounts in base year in thousand quintals.

TABLE 21: INDICES OF TOTAL PRODUCTION, MARKETING SURPLUS AND CONSUMPTION OF SUGARCANE

Year	Sales as a Percent of Output	Index of Production	Index of Sales	Index of Consumption ^a
1952	45.5	100.0 (1369.0)	100.0 (622.9)	100.0 (74.61)
1953	49.3	109.6	118.7	101.7
1954	63.1	104.6	144.9	70.7
1955	59.4	120.5	157.4	89.5
1956	55.1	113.6	137.6	93.5
1957	57.2	123.9	155.8	97.2
1958	68.7	186.1	281.1	106.5
1959	70.0	173.7	267.4	95.4
1960	52.7	107.0	124.0	92.6
1961	66.6	154.1	225.4	94.3
1962	72.0	216.9	343.2	111.2
1963	76.4	212.6	357.2	91.7
1964	86.1	171.7	324.8	43.8
1965	83.5	237.6	436.3	71.6

Figures in parentheses give amounts in the base year in thousand quintals.

^a Consumption of home processed brown sugar (gur).

TABLE 22: ANNUAL LABOR USE IN CENTRAL PUNJAB (1952-1965)

Year	Annual Labor Used (In 1000 Man Days)	Annual Labor Available (In 1000 Man Days)	Annual Family Labor Available (In 1000 Man Days)	Index of Annual Labor Use (1952=100)	% of Total Labor Available	% of Family Labor Available
1952	118,728	187,141	144,458	100.0	63.4	82.2
1953	121,440	190,414	146,983	102.3	63.7	82.6
1954	119,976	193,676	149,507	101.1	61.9	80.2
1955	113,616	196,939	152,031	95.7	57.7	74.7
1956	112,921	200,198	154,552	95.1	56.4	73.1
1957	106,719	203,526	157,132	89.9	52.4	67.9
1958	104,446	206,748	159,603	87.8	50.4	65.4
1959	108,441	210,014	162,124	91.3	51.6	66.9
1960	107,165	213,265	164,645	90.3	50.2	65.1
1961	105,298	216,537	167,169	88.7	48.6	63.0
1962	106,839	219,794	169,689	90.0	48.6	63.0
1963	110,762	223,058	172,214	93.3	49.7	64.3
1964	113,820	226,329	174,736	95.9	50.3	65.1
1965	124,963	229,590	177,259	105.3	54.4	70.5

TABLE 23: INDICES OF SEASONAL LABOR USE IN CENTRAL PUNJAB (1952-1965)

Period Year	I July 1- July 31	II Aug. 1- Oct. 15	III Oct. 15- Nov. 15	IV Nov. 16- Mar. 15	V Mar. 16- Apr. 15	VI Apr. 16- Apr. 30	VII May 1- June 30
1952	100.0 (6500.0)	100.0 (18520.0)	100.0 (13986.0)	100.0 (50486.0)	100.0 (8426.0)	100.0 (7369.0)	100.0 (13441.0)
1953	106.6	102.9	105.8	100.5	101.7	101.4	103.2
1954	106.0	102.7	105.2	97.5	96.2	106.9	105.2
1955	96.0	92.7	100.0	93.5	92.7	114.3	97.9
1956	98.7	89.5	106.7	91.4	88.0	120.8	98.9
1957	97.3	79.3	106.2	84.7	83.2	116.5	95.5
1958	102.9	84.3	96.3	79.9	76.0	135.3	100.7
1959	116.8	87.6	105.8	80.2	75.7	142.8	107.4
1960	116.0	90.0	102.5	73.9	64.2	150.2	110.4
1961	116.8	90.0	98.8	70.2	66.8	151.4	111.5
1962	121.0	90.5	100.4	69.9	64.5	161.8	115.5
1963	134.2	96.6	103.5	70.4	63.2	165.8	123.5
1964	139.7	101.3	112.5	68.6	55.5	178.5	132.4
1965	166.0	112.5	122.6	73.1	61.7	192.8	147.6

Figures in parentheses give the labor use in the base year 1952 in thousand man days per period.

TABLE 24: SEASONAL LABOR USED AS A PERCENTAGE OF TOTAL LABOR AVAILABLE IN CENTRAL PUNJAB (1952-1965)

Year	I	II	III	IV	V	VI	VII
1952	41.3	48.0	88.8	82.9	53.6	77.4	43.5
1953	43.3	48.6	92.4	81.9	53.5	77.2	44.1
1954	42.3	47.7	90.3	78.1	49.8	80.0	44.2
1955	37.7	42.4	84.4	73.6	47.2	83.7	40.5
1956	38.1	40.1	88.7	70.8	44.1	87.4	40.1
1957	36.9	35.0	86.7	64.5	40.9	82.2	38.1
1958	38.4	36.7	77.5	59.9	36.8	94.8	39.6
1959	43.0	37.5	83.8	59.2	36.3	98.5	41.5
1960	42.1	38.0	80.0	53.4	30.1	102.1	42.1
1961	41.7	37.4	75.9	50.3	30.9	101.3	41.8
1962	42.6	37.0	76.0	49.3	29.9	106.7	42.7
1963	46.5	38.9	77.2	48.9	28.4	107.8	43.4
1964	47.7	40.2	82.7	47.0	24.5	114.3	47.6
1965	55.9	44.1	88.9	49.4	26.9	121.7	52.3

TABLE 25: SEASONAL LABOR USED AS A PERCENTAGE OF FAMILY LABOR AVAILABLE IN
CENTRAL PUNJAB (1952-1965)

Year	I	II	III	IV	V	VI	VII
1952	53.5	62.2	115.1	107.4	69.4	100.3	56.3
1953	56.1	62.9	119.7	106.1	69.3	100.0	57.1
1954	54.8	61.8	117.0	101.2	64.5	103.6	57.2
1955	48.8	54.9	109.4	95.4	61.2	108.4	52.4
1956	49.4	52.0	114.9	91.7	57.1	113.2	52.0
1957	47.8	45.4	112.3	83.6	53.0	106.5	49.4
1958	49.8	47.5	100.4	77.6	47.7	127.6	53.8
1959	55.7	48.6	108.5	76.7	46.8	127.6	53.8
1960	54.5	49.2	103.6	69.6	39.0	132.2	54.5
1961	54.0	48.4	98.3	65.2	40.0	131.2	54.2
1962	55.2	47.9	98.5	63.9	38.1	138.2	55.3
1963	60.2	50.4	100.0	63.4	36.8	139.6	56.3
1964	61.8	52.1	107.1	60.9	31.8	148.1	61.6
1965	72.4	57.1	115.1	64.0	34.9	157.7	67.7

TABLE 26 INDICES OF TOTAL CASH OUTLAYS, AND TOTAL CASH OUTLAYS PER UNIT OF
OUTPUT, PER CULTIVATED ACRE AND PER MAN DAY

Year	Total Cash Outlays	Total Cash Outlays		
		Per Unit Of Output	Per Cultivated Acre	Per Man Day
1952	100.0 (251.83)	100.0 (0.5285)	100.0 (110.37)	100.0 (2.1712)
1953	102.0	97.8	101.79	99.72
1954	91.9	84.15	89.19	90.60
1955	88.6	79.04	85.19	92.58
1956	99.4	86.67	92.68	104.52
1957	96.2	80.64	96.39	107.0
1958	95.3	74.57	90.32	108.54
1959	104.7	79.19	94.14	114.67
1960	100.6	72.18	83.82	111.41
1961	96.7	66.92	80.53	109.02
1962	105.0	66.67	87.38	116.67
1963	110.7	66.29	93.19	118.65
1964	128.6	71.01	110.0	134.09
1965	137.9	68.36	114.49	130.96

TABLE 27: INVESTMENT IN NON-FARM GOODS (INDICES AT CONSTANT 1952 RUPEES)

Year	<u>Annual Investment in Non-Farm Capital Goods</u>			<u>Annual Investment in Non-Farm Variable Inputs</u>		
	Per Unit of Output	Per Acre Cultivated	Per Man Day	Per Unit of Output	Per Acre Cropped	Per Man Day
1952	100.0 (0.00519)	100.0 (1.084)	100.0 (0.0213)	100.0 (0.0225)	100.0 (3.535)	100.0 (0.0925)
1953	116.68	121.46	118.96	110.83	112.67	(113.0)
1954	135.90	144.0	146.79	122.58	126.28	132.40
1955	161.91	174.52	189.65	145.19	156.50	170.07
1956	192.76	206.25	232.49	150.28	154.87	181.25
1957	225.65	269.73	299.44	237.03	263.05	314.54
1958	246.32	298.39	358.54	259.71	296.87	378.01
1959	260.74	309.98	377.54	265.56	292.31	384.52
1960	259.61	301.58	400.77	250.06	275.56	386.02
1961	271.83	326.78	442.84	283.78	327.53	462.31
1962	214.92	284.69	376.11	365.89	458.08	640.30
1963	188.68	265.01	337.72	390.36	504.96	698.71
1964	209.44	324.47	395.51	484.04	654.66	914.06
1965	174.46	292.28	334.19	608.68	896.80	1165.92

TABLE 28: PRODUCTION AND CONSUMPTION OUTLAYS, DEBT REPAYMENT, TOTAL CASH REQUIREMENTS, CROP SALES AND BORROWINGS

Year	Total Production Outlays (1)	Net Consumption Outlays* (2)	Repayment On Previous Borrowings (3)	Total Cash Requirements (\$ = 1+2+3) (4)	Gross Sales In Previous Year (5)	Current Borrowing Requirements (4-5) (6)	Borrowing As A % of Total Requirements (7)
(Million Rupees)							
1953	262.98	56.8	53.47	373.25	267.87	105.38	28.23
1954	247.75	96.24	111.70	455.69	277.69	178.00	39.06
1955	225.57	95.31	188.68	509.56	324.29	185.27	36.36
1956	236.92	67.2	196.39	500.51	286.69	214.14	42.78
1957	261.1	59.54	226.99	547.63	249.24	298.39	54.49
1958	266.26	89.15	316.29	671.60	334.06	337.64	50.27
1959	304.8	103.27	357.89	765.96	362.25	403.71	52.71
1960	303.7	65.89	427.93	796.98	417.81	379.17	47.58
1961	311.42	65.23	401.92	778.57	435.18	343.39	44.11
1962	338.92	74.77	363.99	777.68	494.91	282.77	36.36
1963	365.1	60.19	299.74	725.03	538.64	186.39	25.71
1964	448.6	96.14	197.57	742.31	625.86	116.45	15.69
1965	542.71	102.33	123.44	768.48	745.71	22.77	2.96
1966	N.A.	N.A.	24.14	N.A.	986.09	N.A.	N.A.

* Gross Consumption Expenditures Less Non-Farm Cash Incomes From Off-Farm Employment and Other Non-Farm Activities.

TABLE 29: INDICES OF INPUT TO TOTAL OUTPUT*

Year	Labor/Output Ratio	Bullock Labor/ Output Ratio	Machine Use/ Output Ratio	Working Capital/ Output Ratio	Land Use**/ Output Ratio	Market Sales/ Output Ratio*
1952	100.0 (0.2433)	100.0 (0.1298)	100.0 (0.0234)	100.0 (0.5285)	100.0 (0.00652)	100.0 (0.5311)
1953	98.10	94.34	116.58	97.80	98.37	102.97
1954	92.58	87.36	135.98	84.15	97.07	110.43
1955	85.37	75.38	157.27	79.04	92.77	108.20
1956	82.91	71.23	182.39	86.67	98.78	110.81
1957	75.36	56.92	201.34	80.64	90.11	114.25
1958	68.70	47.96	213.77	74.57	87.48	117.29
1959	69.06	47.66	243.49	79.19	90.85	122.09
1960	64.78	43.04	227.76	72.18	90.75	123.74
1961	61.38	36.68	269.62	66.92	86.65	126.57
1962	57.14	32.19	266.09	66.67	79.87	127.75
1963	55.86	32.16	269.58	66.29	77.31	132.39
1964	52.95	31.14	260.80	71.01	73.94	142.02
1965	52.21	30.64	244.96	68.36	67.87	145.26

Figures in parentheses give the ratios in the base year 1952.

* Total output is the value of total production at constant 1952 prices. Working capital use and market sales are also in constant prices.

** Land use is measured in terms of cropped acres.

TABLE 30: INDICES OF VARIOUS INPUTS PER CULTIVATED* ACRE

Year	Labor Days Per Acre	Bullock Labor Days Per Acre	Tractor Hours Per Acre	Diesel Hours Per Acre	Working Capital Per Acre*	Total Output Per Acre*
1952	100.0 (50.83)	100.0 (27.11)	100.0 (0.65)	100.0 (2.30)	100.0 (110.37)	100.0 (208.85)
1953	102.1	98.20	121.16	121.56	101.79	104.09
1954	98.15	92.62	144.95	143.74	89.19	106.02
1955	92.02	81.25	171.92	168.56	85.19	107.79
1956	88.71	76.21	198.69	193.56	92.68	107.00
1957	90.08	68.04	253.00	235.57	96.39	119.53
1958	83.22	58.10	289.00	246.45	90.32	121.14
1959	82.10	56.65	310.61	283.00	94.14	118.88
1960	75.25	50.00	274.75	260.33	83.82	116.17
1961	73.86	44.10	326.98	323.23	80.53	120.03
1962	74.88	42.21	362.06	343.09	87.38	131.19
1963	78.46	45.14	381.83	377.29	93.10	140.46
1964	82.03	48.25	382.55	413.00	110.00	154.92
1965	87.46	51.30	399.17	415.03	114.49	167.52

Figures in parentheses give the value in the base year 1952.

* Output and working capital are measured in constant 1952 prices.

** Cultivated acreage, as distinct from cropped acreage, is a physical measure of an area under cultivation and does not account for double cropping.

TABLE 31: INDICES OF VARIOUS INPUT TO LABOR RATIOS AND THE OUTPUT/LABOR RATIOS

Year	Bullock Labor/ Labor Ratio	Mechanical Power/ Labor Ratio	Land/Labor Ratio	Working Capital/ Labor Ratio*	Total Output/ Labor Ratio*	Total Sales/ Labor Ratio*
1952	100.0 (0.5333)	100.0 (0.0961)	100.0 (0.0197)	100.0 (2.1712)	100.0 (4.109)	100.0 (2.182)
1953	96.18	118.87	97.95	99.72	101.96	104.98
1954	94.36	146.88	101.88	90.60	108.01	119.29
1955	88.29	185.22	108.67	92.58	117.13	126.75
1956	85.90	219.98	112.72	104.52	120.60	133.64
1957	75.53	267.18	111.01	107.00	132.70	151.61
1958	69.82	311.16	120.15	108.54	145.55	170.72
1959	69.00	352.57	121.79	114.67	144.79	176.78
1960	66.44	351.61	132.89	111.41	154.37	191.02
1961	59.75	439.23	135.40	109.02	162.90	206.20
1962	56.33	465.67	133.55	116.67	175.00	223.55
1963	57.53	482.53	127.43	118.65	178.99	236.97
1964	58.81	492.49	121.89	134.09	188.84	268.19
1965	58.69	469.23	114.34	130.96	191.55	278.25

Figures in parentheses give the ratios in the base year 1952.

*Output, sales and capital use are measured at constant 1952 prices.

TABLE 32: WAGE RATES AND OPERATING COSTS FOR BULLOCKS AND TRACTORS

Period	Labor		Labor	Labor		Labor	Bullock	25 HP Tractor	Ratio of Hourly	
	I	III ^a	IV ^b	II	VII ^c	V	VI ^d	Labor ^e	(Rs./Hour) ^f	Tractor/Bullock
										Cash Costs
Year	(In Rs./Day)									
1951	1.70		2.42	1.30		2.12		1.62	2.15	10.62
1952	1.78		2.42	1.42		2.26		1.57	2.12	10.80
1953	1.86		2.45	1.52		2.40		1.54	2.08	10.81
1954	2.01		2.37	1.69		2.56		1.40	2.07	11.83
1955	1.98		2.50	1.69		2.69		1.28	2.02	12.62
1956	1.98		2.50	1.75		2.62		1.41	1.98	11.23
1957	2.16		2.37	2.02		3.13		1.61	2.17	10.79
1958	2.29		2.51	2.03		2.51		1.52	2.36	12.42
1959	2.35		2.36	2.12		2.30		1.82	2.40	10.55
1960	2.45		2.20	2.37		2.40		1.63	2.41	11.83
1961	2.50		2.28	2.39		2.48		1.60	2.50	12.50
1962	2.59		2.61	2.60		2.80		1.60	2.54	12.70
1963	2.82		2.52	2.59		2.88		1.57	2.59	13.2
1964	2.89		2.91	2.93		3.61		1.83	2.90	12.68
1965	3.19		2.84	3.02		3.62		1.86	3.01	12.94

Notes: Average of wages for a) plowing and sowing tasks, b) "other" tasks, c) the cultivation tasks, d) harvesting tasks; e) includes only the costs of purchased concentrates, excludes fodder, f) costs of fuel, oil, maintenance and repairs.

Sources: Statistical Abstract of the Punjab, 1965 and I.J. Singh (1971, pp. 319-320).

TABLE 33: NUMBER OF BULLOCK AND TRACTOR/MACHINE HOURS REQUIRED FOR THE PERFORMANCE OF SPECIFIC TASKS AND THE FODDER COSTS ASSOCIATED WITH TRADITIONAL TECHNOLOGIES

Task	Bullock Hours Required Per Standard Unit	Tractor/Machine Hours Required Per Standard Unit	Fodder Acre Equivalents Required By Bullock Technology ^f	Fodder Costs @ 1965 Rental Values for Rabi Irrigated Land ^g
1. Land Preparation ^a	22	1.375 (25 H.P. Tractor)	0.0715	Rs. 95.81
2. Irrigation ^b	31.2	1.7 (7.5 H.P. Diesel)	0.1014	Rs. 135.88
3. Harvesting and Threshing Winter Crops ^c	40.0	4.15 (25 H.P. Tractor)	0.13	Rs. 174.2 ^d
4. Sugarcane Crushing and Gur Preparation ^d	214.0	35.8 (7.5 H.P. Diesel)	0.6955	Rs. 931.97
5. Transportation ^e	5.0	0.25 (25 H.P. Tractor)	0.0163	Rs. 21.84

Notes: a) A standard land preparation unit is defined as 2 plowings and one planking, b) a standard irrigation is defined as 3 acre inches of water delivered, c) a standard harvest and threshing involves 10 quintals of output, d) per 100 quintals of cut and stripped cane and e) per 10 quintals of produce transported an average distance of 2.5 miles to the market.

f) Assuming a consumption of 0.65 quintals of green fodder per animal per work day and a fodder yield of 200 quintals per acre on irrigated land.

g) shadow price of rabi irrigated land was Rs. 1340/acre in model in 1965.

Sources: I.J. Singh, R.H. Day and S.S. Jhnl (1968) and I.J. Singh (1971).

TABLE 34: THE SHADOW PRICES OF VARIOUS MACHINE CAPACITIES

Year	Seasonal Tractor Capacities (In Rs./Hr.)		Tubewell Irrigation Capacities (In Rs./Std. Irrigation)		Rabi Threshing Capacity (Rs./Qt.)	Tractor Transportation Capacity (In Rs./Qt.)	
	Period III	Period VII	Rabi	Kharif		Rabi	Kharif
1952	139.4	50.9	159.5	47.7	*	2.84	4.77
1953	138.3	49.5	157.2	78.0	*	2.76	4.76
1954	147.9	65.1	168.8	89.6	*	3.17	5.18
1955	55.5	30.4	74.2	62.5	*	2.21	4.40
1956	51.2	26.7	68.6	57.1	*	2.09	4.18
1957	56.0	30.6	73.7	16.8	106.4	2.19	4.42
1958	62.9	35.0	83.3	18.5	100.2	2.40	4.91
1959	67.9	37.3	91.5	21.5	161.9	2.72	5.47
1960	72.3	43.6	97.2	20.4		2.94	5.58
1961	40.5	36.9	82.9	20.6	21.5	2.93	2.93
1962		32.5	28.9	21.2	21.9	2.77	2.77
1963	40.9	34.4	29.1	21.5	24.8	2.88	3.12
1964	75.0	33.6	30.9	22.1	4.8	2.81	5.98
1965	80.4	37.5	34.0	24.6	4.9	3.14	6.39

* No power threshers in operation.

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